

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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IN REPLY REFER TO:

Theoretical Division  
Goddard Space Flight Center  
8719 Colesville Road  
Silver Spring, Maryland

Prof. Joshua Lederberg  
Department of Physics  
Stanford University  
Stanford, California

Dear Dr. Lederberg:

In conjunction with the ideas which you have expressed that there may be life on the moon or in space or on other planets, it occurred to me that there might be several biological experiments which could be tried at this time and which would help to delimit the possibilities.

In the first place, would it be possible to determine whether a spore could survive a fall onto the lunar surface? The terminal velocity is approximately 9,000 feet per second, which can be reached by light gas guns. Would it be possible to fire pellets of various sizes containing bacteria and then test whether any of them survive the impact? A priori, one would think that on a large pellet some portions might survive the impact; but that as the pellet was reduced in size a limit would be reached below which no life would survive. Such a demonstration would eliminate the possibility of life reaching the moon through space.

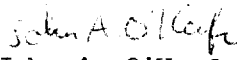
In the second place, it might be possible to expose Petri dishes at high altitudes in airplanes to determine whether there are any bacteria riding on the micrometeorites. This experiment might be useful in distinguishing between the true micrometeorites, which should contain non-terrestrial forms of life if any, and dust contaminations which might carry terrestrial forms of life. (At the present time, it is very difficult to think of any way of discriminating between micrometeorites and terrestrial particles.)

In the third place, if it were possible to secure the Igast object it might be worthwhile to examine it. I believe the Igast object to be a portion of the moon's crust which has not been remelted in flight. It is imaginable that if life or

organic substances exist on the moon they would have been brought to us by this object. The likelihood is similar to that for any other body brought back from the moon.

Do you have any information about the sterilization techniques used by the Russians? I am told that the problem of sterilization is so difficult that their precautions would have had to be quite extensive.

Sincerely yours,

  
John A. O'Keefe  
Assistant Chief,  
Theoretical Division

JAO:sbb